

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Borran, *et al.*
Title: METHOD AND APPARATUS TO ESTABLISH
CONSTELLATIONS FOR IMPERFECT CHANNEL STATE
INFORMATION AT A RECEIVER
Appl. No.: 10/523,167
Filing Date: 3/10/2006
Examiner: Kevin Michael Burd
Art Unit: 2611
Confirmation Number: 8220

PRE-APPEAL BRIEF REQUEST FOR REVIEW

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In accordance with the **Pre-Appeal Brief Conference Pilot Program**, announced July 11, 2005, this Pre-Appeal Brief Request is being filed together with a Notice of Appeal and with the required fee in response to the Final Office Action dated October 15, 2009, and the Advisory Action dated December 31, 2009.

Finality of Office Action

In section 3 of the Final Office Action, the Examiner stated:

All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. ...

The after final amendment presented 9/8/2009 **was not entered** and applicant has presented new claim amendments with the RCE. If these new claim amendments were presented in the after final amendment, the amendment would have been entered after final, and the finality of the rejection of the claims would have been maintained because the prior art discloses this amended feature as stated in the previous office actions.

(Emphasis added). Applicants respectfully disagree. First, the amendments presented in the after final amendment amended the dependent claims to include a feature taken directly from a dependent claim which was canceled and did not introduce new subject matter or raise new issues that would require further consideration and/or search. Therefore, the failure to enter these amendments was improper. Second, Applicants chose to amend the claims to introduce

an element that was not previously included in the claims and filed an RCE to require entry of this amendment. This amendment should have required further consideration and/or search yet the Examiner asserts that these amendments would have been entered. Third, the Examiner asserts that the “claims are drawn to the same invention claimed in the application prior to the entry of the submission” despite the fact that the Examiner has never considered the claim element “selecting a signal constellation, at a communication device, based on a channel estimation error” as recited in Claim 26. Therefore, Applicants submit that the finality of the rejection is improper and request withdrawal of the finality of the rejection.

Rejection of Claims 26, 27, 30, 31, 35, 36, 39, 40, 44-49, and 51-53 Under 35 U.S.C. § 102

In section 6 of the Final Office Action, Claims 26, 27, 30, 31, 35, 36, 39, 40, 44-49, and 51-53 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,560,445 to Fette *et al.* (*Fette*). Applicants disagree. *Fette* fails to teach, suggest, or disclose all of the elements of at least independent Claims 26, 35, 46, 47, 49, 51, and 53.

Claim 26 recites in part “selecting a signal constellation, at a communication device, based on a channel estimation error.” Claims 35, 46, 47, 49, 51, and 53, though of different scope, recite a similar feature. On pages 4-5 of the Final Office Action, the Examiner states:

The signal to noise ratio (SNR) of each coefficient is used to determine the constellation that will be used for transmission (column 8, lines 20-51). The SNR is an estimation of the quality of the channel used for communication. The channel quality is a channel estimation and errors in the channel quality (a reduced level of channel quality) represent channel estimation errors. The level of the signal is determined as is the level of the noise present in the channel to determine a signal-to-noise-ratio (SNR). The noise or distortion present in the communication channel is a channel estimation error since the noise or distortion represents errors in the channel. When little or no distortion is detected, the error is minimized and the signal is transmitted with minimal interference.

(Underlining added). The SNR cannot be related to “a channel estimation error.” Even if the relationships drawn by the Examiner were true, which Applicants do not concede, the Examiner’s logic does not arrive at a relationship that equates the SNR to “a channel estimation error.” The Examiner’s logic results in SNR->channel quality->channel estimation and errors->channel estimation errors. Thus, the Examiner comes to the unremarkable conclusion that errors represent errors, but fails to indicate a basis for equating the SNR to “a channel estimation error.”

Second, Applicants further respectfully disagree with the Examiner’s statement that “noise or distortion present in the communication channel is a channel estimation error since the noise or distortion represents errors in the channel.” Noise and distortion are two different signal parameters, and noise does not represent *errors* in the channel. Noise effects the ability to detect the signal, and is not itself “a channel estimation error.” At column 8, lines 20-38, cited by the Examiner, *Fette* states:

In the simulation, all cepstral coefficients are modulated with random noise, ranging over the values -1 to +1. This may be performed one coefficient at a time or in multiples of coefficients or even all coefficients, each with independent noise. The simulation of many baud of communication is performed (assume at least 10 times the number of bits to be delivered under these conditions). The receive simulation decodes and recovers the cepstral coefficients, which can now be correlated with those coefficients transmitted. This correlation now provides evidence of the signal to noise ratio (SNR) of each cepstral coefficient and its ability to convey information. This process will also produce a model of how the various forms of interference degrade or offset the cepstral coefficients. Also, certain types of interference may be detected and eliminated by recognizing that a certain cepstral coefficient was always modulated to be zero and that, by receiving as non-zero, the location of interference may be recovered in the spectrum and its artifact removed.

(Underlining added). Thus, contrary to the Examiner's statement, the cited section of *Fette* teaches nothing whatsoever related to "selecting a signal constellation, at a communication device, based on a channel estimation error" as recited in independent Claim 26, and similarly recited in Claims 35, 46, 47, 49, 51, and 53. To the contrary, according to *Fette*, the constellation is selected by identifying a SNR in the created "table or set of tables" (col. 9, ll. 46-47) that is closest to the actual received SNR. The SNR is not a channel estimation error. The SNR is a measure of the signal power to the noise power, neither of which is an error. Therefore, *Fette* fails to provide any teaching of at least "selecting a signal constellation, at a communication device, based on a channel estimation error" as recited in independent Claim 26, and similarly recited in Claims 35, 46, 47, 49, 51, and 53.

Applicants also respectfully point out that Claims 27, 36, and 52 recite "wherein the signal constellation is further selected based on a signal to noise ratio." Thus, based on claim differentiation, "a channel estimation error" is distinguishable from "a signal to noise ratio" or Claims 27, 36, and 52 would not narrow Claims 26, 35 and 51, respectively.

For at least these reasons, Applicants respectfully submit that *Fette* fails to teach, suggest, or describe all of the elements recited in at least independent Claims 26, 35, 46, 47, 49, 51, and 53. A rejection under 35 U.S.C. § 102 cannot be properly maintained where the reference fails to teach each and every element of the rejected claims. The remaining claims depend from one of Claims 26, 35, 47, or 51. Thus, Applicants respectfully request withdrawal of the rejection of Claims 26, 30, 35, 36, 39, 40, 44-49, and 51-53.

Rejection of Claims 28, 29, 37, and 38 Under 35 U.S.C. § 103(a)

In section 7 of the Final Office Action, Claims 28, 29, 37, and 38 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Fette* in view of U.S. Patent Publication No. 2002/0090035 to Seshadri *et al.* (*Seshadri*). Applicants respectfully disagree because *Fette* and *Seshadri*, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least independent Claims 26 and 35 from which Claims 28, 29, 37, and 38 depend.

Fette fails to teach, suggest, or disclose all of the elements of at least independent Claims 26 and 35. *Seshadri* fails to remedy the deficiencies of *Fette*. *Seshadri* describes a method “used to generate set partitioning structures and trellis structures that enable code designers to systematically design the codes of the invention.” (Abstract). *Seshadri* states:

Once the rate has been selected, other aspects of the communications system and code are fixed. For example, a rate of 1 bit/second/hertz means that the system will have a constellation size of 2 (a BPSK system). A rate of 2 bits/second/hertz means the system will have a constellation size of 4 (a QPSK system). A rate of 3 bits/second/hertz means that the system will have a constellation size of 8 (an 8-PSK system). In general, the constellation size (L) will equal $2^{\text{sup.b}}$, where b represents the selected rate. Also, as described herein, once the rate is selected, the number of input bits provided to lookup table 506 is 2b. Thus, selecting a rate is an important design consideration.

(Para. [0083]; underlining added). Thus, according to *Seshadri*, the constellation can be selected based on a rate where the “selected rate represents the number of bits transmitted in a given period of time.” (Para. [0082]). However, *Seshadri* fails to provide any teaching of at least “selecting a signal constellation, at a communication device, based on a channel estimation error” as recited in independent Claim 26, and similarly recited in Claim 35.

Thus, *Fette* and *Seshadri*, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least independent Claims 26 and 35. An obviousness rejection cannot be maintained when the combination of references cited fails to teach each and every element recited in the claims. As a result, Applicants respectfully request withdrawal of the rejection of Claims 28, 29, 37, and 38, which depend from Claims 26 and 35.

Rejection of Claims 32, 41, and 50 Under 35 U.S.C. § 103(a)

In section 8 of the Final Office Action, Claims 32, 41, and 50 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Fette* in view of *Dabak et al.*, “Signal Constellations for Non-Gaussian Communication Problems” (*Dabak*). Applicants respectfully disagree because *Fette* and *Dabak*, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least independent Claims 26, 35, and 49, from which Claims 32, 41, and 50 depend, respectively.

Fette fails to teach, suggest, or disclose all of the elements of independent Claims 26, 35, and 49. *Dabak* fails to remedy the deficiencies of *Fette*. *Dabak* describes a “procedure for determining optimum signal sets.” (Abstract). *Dabak* states that “[o]ptimum signal constellations depend on signal-to-noise ratio.” (Abstract). *Dabak* further states that “[f]or small M, we can calculate optimal signal sets by maximizing the sum of all intersignal distance measures under a signal-related constraint.” (Page 34, Section 3). However, *Dabak* fails to provide any teaching of at least “selecting a signal constellation, at a communication device, based on a channel estimation error” as recited in independent Claim 26, and similarly recited in Claims 35 and 49.

Thus, *Fette* and *Dabak*, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least independent Claims 26, 35, and 49. An obviousness rejection cannot be maintained when the combination of references cited fails to teach each and every element recited in the claims. As a result, Applicants respectfully request withdrawal of the rejection of Claims 32, 41, and 50, which depend from Claims 26, 35, and 49.

Rejection of Claims 33, 34, 42, and 43 Under 35 U.S.C. § 103(a)

In section 9 of the Final Office Action, Claims 33, 34, 42, and 43 were rejected under 35 U.S.C. § 103(a) as being unpatentable over *Fette* in view of U.S. Patent No. 6,674,820 to Hui *et al.* (*Hui*). Applicants respectfully disagree because *Fette* and *Hui*, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least independent Claims 26 and 35 from which Claims 33, 34, 42, and 43 depend.

Fette fails to disclose the elements of Claims 26 and 35. *Hui* fails to remedy the deficiencies of *Fette*. *Hui* describes a method “in which, over each synchronization signal period or other determinate information window, the channel coefficients and the color of the baseband noise are concurrently estimated.” (Abstract). *Hui* states:

To extract the transmitted signal (or symbols) from the received signal, the receiver of a mobile terminal typically includes a demodulator which may be a coherent demodulator such as a maximum likelihood sequence estimation (MLSE) demodulator (or equalizer). To adapt to the channel variation from each data burst to the next, an associated channel estimator is typically provided for the demodulator. The channel estimator typically operates using known transmitted symbols.

(Col. 1, ll. 57-65). However, *Hui* fails to provide any teaching of at least “selecting a signal constellation, at a communication device, based on a channel estimation error” as recited in independent Claim 26, and similarly recited in Claim 35.

Thus, *Fette* and *Hui*, alone and in combination, fail to teach, suggest, or disclose all of the elements of at least independent Claims 26 and 35. An obviousness rejection cannot be maintained when the combination of references cited fails to teach each and every element recited in the claims. As a result, Applicants respectfully request withdrawal of the rejection of Claims 33, 34, 42, and 43, which depend from Claims 26 and 35.

Respectfully submitted,

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